

CLAIMS

What is claimed is:

1. A mapping tool graphical user interface, comprising:
 a source screen region adapted to display a graphical representation of a source object;
 a target screen region adapted to display a graphical representation of a target object; and
 a mapping screen region adapted to allow a user to create a mapping between the graphical representation of the source object and the graphical representation of the target object using graphical mapping indicia.
2. The user interface of claim 1, wherein the source and target objects comprise at least one source node and at least one target node respectively, and wherein the graphical mapping indicia comprises at least one of a link indicia and a function object adapted to associate the at least one target node with the at least one source node.
3. A mapping tool graphical user interface, comprising:
 a source screen region adapted to display a graphical representation of a source object including a source tree structure having a hierarchical representation of nodes, wherein each node lower in the source hierarchy is indented with respect to nodes higher in the source hierarchy;
 a target screen region adapted to display a graphical representation of a target object including a target tree structure having a hierarchical representation of nodes, wherein each node lower in the target hierarchy is indented with respect to nodes higher in the target hierarchy; and
 a mapping screen region adapted to allow a user to create a mapping between the graphical representation of the source object and the graphical representation of the target object using graphical mapping indicia.

4. The user interface of claim 3, wherein the mapping screen region is between the source and target screen regions, and wherein the hierarchical indentation of nodes in the source and target screen regions is toward the mapping screen region.

5. The user interface of claim 3, wherein the graphical mapping indicia comprises at least one of a link indicia and a function object adapted to associate at least one target node with at least one source node.

6. The user interface of claim 3, wherein one of the source screen region and the target screen region further comprises a scroll bar adapted to allow a user to selectively display portions of one of the source object tree structure and the target object tree structure.

7. The user interface of claim 3, further adapted to allow a user to select a node in one of the source screen region and the target screen region, wherein one of the source screen region and the target screen region further comprises a node selection indicia adapted to indicate a selected node in one of the source object tree structure and the target object tree structure.

8. The user interface of claim 7, further comprising a node properties page in a node properties page screen region adapted to display a property associated with the selected node, and further adapted to allow a user to modify the property associated with the selected node.

9. The user interface of claim 3, wherein one of the source object tree structure and the target object tree structure comprises a collapse indicia associated with one of a root node and a record node in the one of the source object tree structure and the target object tree structure, wherein the collapse indicia is adapted to allow a user to collapse and expand the one of a root node and a record node in a hierarchical fashion, and wherein the one of the source object tree structure and the target object

tree structure is displayed in one of a collapsed form and an expanded form according to the collapse indicia.

10. The user interface of claim 9, wherein the graphical mapping indicia comprises at least one of a link indicia and a function object adapted to associate at least one target node with at least one source node, and wherein the link indicia comprises a collapsed link indicia adapted to indicate the association between the at least one target node and the at least one source node when the one of the source object tree structure and the target object tree structure is displayed in the collapsed form.

11. A mapping tool graphical user interface, comprising:
a source screen region adapted to display a graphical representation of a source object;
a target screen region adapted to display a graphical representation of a target object;
a mapping screen region adapted to allow a user to create a mapping between the graphical representation of the source object and the graphical representation of the target object using graphical mapping indicia; and
a graphical compiler object adapted to allow the user to generate compiled mapping output code using a compiler.

12. The user interface of claim 11, wherein the source and target objects comprise at least one source node and at least one target node respectively, wherein the compiler is adapted to create a compiler link between the at least one source node and the at least one target node, and wherein the mapping screen region further comprises a compiler link indicia associated with the compiler link.

13. The user interface of claim 12, wherein the compiler link indicia comprises a dashed line between the at least one source node and the at least one target node.

14. The user interface of claim 12, wherein the compiler link indicia is adapted to allow the user to select the compiler link indicia and move the compiler link indicia to one of another source node and another target node.

15. The user interface of claim 11, further comprising an output code screen in an output screen region adapted to display the compiled mapping output code.

16. The user interface of claim 15, wherein the output code screen is further adapted to display a compiler warning.

17. The user interface of claim 16, wherein the output code screen is further adapted to allow the user to select the compiler warning, and wherein the mapping region includes a compiler warning indicia adapted to indicate at least one graphical mapping indicia as being associated with the selected compiler warning.

18. A mapping tool graphical user interface, comprising:
a source screen region adapted to display a graphical representation of a source object having a source node;
a target screen region adapted to display a graphical representation of a target object having a target node; and
a mapping screen region adapted to allow a user to create a mapping between the graphical representation of the source object and the graphical representation of the target object using graphical mapping indicia with a graphical link indicia adapted to associate the target node with the source node.

19. The user interface of claim 18, wherein the graphical link indicia comprises a line in the mapping screen region between the target node and the source node.

20. The user interface of claim 18, wherein the graphical mapping indicia further comprises a graphical function object, and wherein the graphical link indicia comprises a line in the mapping screen region between two of the target node, the source node, and the function object.

21. The user interface of claim 20, wherein the mapping screen region is adapted to allow a user to create a link by selecting one of the target node, the source node, and the function object, and selecting another of the target node, the source node, and the function object, and wherein the mapping screen region is further adapted to display a graphical link indicia between the one of the target node, the source node, and the function object, and the another of the target node, the source node, and the function object.

22. The user interface of claim 20, wherein the mapping screen region is adapted to allow a user to move a link by selecting the line near one of the two of the target node, the source node, and the function object, and moving the line to the other of the target node, the source node, and the function object.

23. The user interface of claim 18, wherein the mapping screen region is further adapted to allow a user to select the graphical link indicia and wherein the mapping screen region further comprises a link selection indicia adapted to indicate that the graphical link indicia has been selected.

24. The user interface of claim 23, further comprising a link properties page in a link properties screen region adapted to display a property associated with a link associated with the selected graphical link indicia, and to allow the user to modify the property.

25. The user interface of claim 24, wherein the property comprises a compiler directive, and wherein the link properties page is further adapted to allow

the user to select one of flattening, top-down, and bottom-up for the compiler directive.

26. The user interface of claim 18,
wherein the source object includes a source tree structure having a source root node, a source record node, and a source field node;

wherein the target object includes a target tree structure having a target root node, a target record node, and a target field node;

wherein the field nodes are indented in hierarchical fashion from the record nodes, and the record nodes are indented in hierarchical fashion from the root nodes;

wherein one of the source object tree structure and the target object tree structure comprises a collapse indicia associated with one of a root node and a record node in the one of the source object tree structure and the target object tree structure;

wherein the collapse indicia is adapted to allow a user to collapse and expand the one of a root node and a record node in a hierarchical fashion, and wherein the one of the source object tree structure and the target object tree structure is displayed in one of a collapsed form and an expanded form according to the collapse indicia; and

wherein the graphical link indicia comprises a collapsed link indicia adapted to indicate the association between the target node and the source node when the one of the source object tree structure and the target object tree structure is displayed in the collapsed form.

27. The user interface of claim 26, wherein the collapsed link indicia is a dashed line.

28. The user interface of claim 26, wherein the mapping screen region is further adapted to allow a user to select the collapsed link indicia, whereby the one of a root node and a record node is expanded and displayed in expanded form.

29. A mapping tool graphical user interface, comprising:

a source screen region adapted to display a graphical representation of a source object;
a target screen region adapted to display a graphical representation of a target object; and
a mapping screen region adapted to allow a user to create a mapping between the graphical representation of the source object and the graphical representation of the target object using graphical mapping indicia;
wherein the source and target objects comprise at least one source node and at least one target node respectively, and wherein the graphical mapping indicia comprises a function object adapted to associate the at least one target node with the at least one source node.

30. The user interface of claim 29, wherein the function object is associated with script used by a compiler to generate compiled mapping output code.

31. The user interface of claim 29, further comprising a function object palette screen in a function object palette screen region, wherein the function object palette screen includes a plurality of function objects, and wherein the function object palette screen is adapted to allow a user to drag and drop a function object from the function object palette screen onto the mapping screen region using a user interface selection device.

32. The user interface of claim 29, further adapted to allow a user to select the function object, wherein the mapping screen region further comprises a function object selection indicia adapted to indicate that the function object has been selected.

33. The user interface of claim 32, further comprising a function object properties page in a function object properties page screen region adapted to display a property associated with the selected function object, and further adapted to allow a user to modify the property.

34. The user interface of claim 33, wherein the function object properties page is further adapted to allow the user to enter a constant value in the function object properties page.

35. The user interface of claim 32, further adapted to allow the user to select a plurality of function objects, and wherein the function object selection indicia is further adapted to indicate that the plurality of function objects have been selected.

36. The user interface of claim 35, further adapted to allow the user to select the plurality of function objects by creating a box around the plurality of function objects using a user interface selection device.

37. The user interface of claim 29, wherein the graphical mapping indicia further comprises a user function object adapted to associate the at least one target node with the at least one source node.

38. The user interface of claim 37, wherein the user function object is associated with user script used by a compiler to generate compiled mapping output code, and wherein the mapping screen region further comprises a function object creation interface adapted allow the user to create the user script and to associate the user script with the user function object.

39. A mapping tool graphical user interface, comprising:
a source screen region adapted to display a graphical representation of a source object;
a target screen region adapted to display a graphical representation of a target object;
a mapping screen region adapted to allow a user to create a mapping between the graphical representation of the source object and the graphical representation of the target object using graphical mapping indicia, and to display at least a portion of the mapping; and

a scrolling indicia in the mapping screen region adapted to allow the user to selectively display portions of the mapping in the mapping screen region.

40. The user interface of claim 39, wherein the mapping screen region comprises an outer perimeter, wherein the mapping screen is adapted to display the scrolling indicia when the user moves a user interface selection device near the outer perimeter, wherein the scrolling indicia is further adapted to indicate a direction in which scrolling is possible, and wherein the mapping screen region is further adapted to scroll the mapping display in the direction indicated by the scrolling indicia when the user selects the scrolling indicia using the user interface selection device.

41. The user interface of claim 39, further comprising a mapping preview page in a mapping preview page region adapted to display the entire mapping.

42. The user interface of claim 41, wherein the mapping preview page further comprises a current region indicia adapted to indicate the portion of the mapping currently displayed in the mapping screen region.

43. The user interface of claim 42, wherein the mapping preview page is further adapted to allow the user to move the current region indicia within the mapping preview page region, to thereby change the portion of the mapping currently displayed in the mapping screen region accordingly.

44. A mapping tool graphical user interface, comprising:
a source screen region adapted to display a graphical representation of a source object;
a target screen region adapted to display a graphical representation of a target object;
a mapping screen region adapted to allow a user to create a mapping between the graphical representation of the source object and the graphical representation of the target object using graphical mapping indicia; and

a test screen region adapted to display a test target object instance according to the mapping.

45. The user interface of claim 44, wherein the test screen region further comprises a test value page adapted to allow a user to associate a constant value with a node in one of the source object and the target object.

46. The user interface of claim 44, wherein the test screen region further comprises a test output page adapted to display the test target object instance.

47. A mapping tool graphical user interface, comprising:
a source screen region adapted to display a graphical representation of a source object;
a target screen region adapted to display a graphical representation of a target object; and
a mapping screen region adapted to allow a user to create a mapping between the graphical representation of the source object and the graphical representation of the target object using graphical mapping indicia;
wherein the user interface is adapted to allow a user to replace one of the source and target objects, and to preserve at least a portion of the mapping.

48. A mapping tool graphical user interface, comprising:
a source screen region adapted to display a graphical representation of a source object;
a target screen region adapted to display a graphical representation of a target object; and
a mapping screen region adapted to allow a user to create a mapping between the graphical representation of the source object and the graphical representation of the target object using graphical mapping indicia;
wherein one of the source and target objects is one of a schema, a spreadsheet, a document, and a database.

49. In a mapping tool graphical user interface, a method of creating a mapping, comprising:

- displaying a graphical representation of a source object in a source screen region;
- displaying a graphical representation of a target object in a target screen region;
- creating a mapping between the graphical representation of the source object and the graphical representation of the target object in a mapping screen region using graphical mapping indicia; and
- displaying the mapping in the mapping screen region.

50. The method of claim 49, wherein the source and target objects comprise at least one source node and at least one target node respectively, and wherein the graphical mapping indicia comprises at least one of a link indicia and a function object adapted to associate the at least one target node with the at least one source node.

51. In a mapping tool graphical user interface, a method of creating a mapping, comprising:

- displaying a graphical representation of a source object including a source tree structure having a source root node, a source record node, and a source field node in a source screen region;
- displaying a graphical representation of a target object including a target tree structure having a target root node, a target record node, and a target field node in a target screen region;
- creating a mapping between the graphical representation of the source object and the graphical representation of the target object in a mapping screen region located between the source and target screen regions using graphical mapping indicia;
- indenting the field nodes toward the mapping screen region in hierarchical fashion from the record nodes; and

indenting the record nodes toward the mapping screen region in hierarchical fashion from the root nodes.

52. The method of claim 51, further comprising:
 selecting a node in one of the source screen region and the target screen region;
 displaying a node selection indicia adapted to indicate a selected node in one of the source object tree structure and the target object tree structure; and
 displaying a property associated with the selected node in a node properties page in a node properties page screen region;
 modifying the property associated with the selected node in the node properties page.

53.
~~52.~~ In a mapping tool graphical user interface, a method of creating a mapping, comprising:
 displaying a graphical representation of a source object in a source screen region;
 displaying a graphical representation of a target object in a target screen region;
 creating a mapping between the graphical representation of the source object and the graphical representation of the target object in a mapping screen region using graphical mapping indicia;
 displaying the mapping in the mapping screen region; and
 displaying a graphical compiler object adapted to allow the user to generate compiled mapping output code using a compiler.

54.
~~53.~~ The method of claim ~~52~~⁵³, wherein the source and target objects comprise at least one source node and at least one target node respectively, further comprising:
 creating a compiler link between the at least one source node and the at least one target node using the compiler; and

displaying a compiler link indicia in the mapping screen region associated with the compiler link.

~~53~~
~~54.~~ The method of claim ~~53~~⁵⁴, further comprising:
selecting the compiler link indicia; and
moving the compiler link indicia to one of another source node and another target node.

~~55~~⁵⁶ The method of claim ~~52~~⁵², further comprising:
displaying an output code screen in an output screen region; and
displaying the compiled mapping output code in the output code screen.

~~56~~⁵⁷ The method of claim ~~55~~⁵⁶, further comprising displaying a compiler warning in the output code screen.

~~57~~⁵⁸ The method of claim ~~56~~⁵⁷, further comprising:
selecting the compiler warning; and
displaying a compiler warning indicia in the mapping region adapted to indicate at least one graphical mapping indicia as being associated with the selected compiler warning.

~~58~~⁵⁹ In a mapping tool graphical user interface, a method of creating a mapping, comprising:
displaying a graphical representation of a source object having a source node in a source screen region;
displaying a graphical representation of a target object having a target node in a target screen region;
creating a mapping between the graphical representation of the source object and the graphical representation of the target object in a mapping screen region using a graphical link indicia in the mapping screen region adapted to associate the target node with the source node; and

displaying the mapping in the mapping screen region.

⁶⁰
~~59.~~ The method of claim ⁵⁹~~58~~, wherein the graphical link indicia comprises a line in the mapping screen region between the target node and the source node.

⁶¹
~~60.~~ The method of claim ⁵⁹~~58~~, wherein creating a mapping further comprises displaying a graphical function object, and wherein the graphical link indicia comprises a line in the mapping screen region between two of the target node, the source node, and the function object.

⁶²
~~61.~~ The method of claim ⁶¹~~60~~, wherein creating a mapping further comprises:
creating a link including:
selecting one of the target node, the source node, and the function object; and
selecting another of the target node, the source node, and the function object; and
displaying a graphical link indicia between the one of the target node, the source node, and the function object, and the another of the target node, the source node, and the function object.

⁶³
~~62.~~ The method of claim ⁶¹~~60~~, further comprising moving a link including:
selecting the line near one of the two of the target node, the source node, and the function object; and
moving the line to the other of the target node, the source node, and the function object.

⁶⁴
~~63.~~ The method of claim ⁵⁹~~58~~, further comprising:
selecting the graphical link indicia; and
displaying a link selection indicia adapted to indicate that the graphical link indicia has been selected.

~~64~~⁶⁴. The method of claim ~~63~~⁶⁴, further comprising:
 displaying a link properties page in a link properties screen region;
 displaying a property associated with a link associated with the selected
 graphical link indicia in the link properties page; and
 modifying the property.

~~65~~⁶⁵. The method of claim ~~64~~⁶⁵, wherein the property comprises a compiler
 directive, and wherein the link properties page is further adapted to allow the user to
 select one of flattening, top-down, and bottom-up for the compiler directive.

~~66~~⁶⁷. In a mapping tool graphical user interface, a method of creating a
 mapping, comprising:
 displaying a graphical representation of a source object with at least one
 source node in a source screen region;
 displaying a graphical representation of a target object with at least one target
 node in a target screen region;
 creating a mapping between the graphical representation of the source object
 and the graphical representation of the target object in a mapping screen region using
 a function object adapted to associate the at least one target node with the at least one
 source node; and
 displaying the mapping in the mapping screen region.

~~67~~⁶⁸. The method of claim ~~66~~⁶⁷, further comprising associating the function
 object with script used by a compiler to generate compiled mapping output code.

~~68~~⁶⁹. The method of claim ~~67~~⁶⁷, further comprising:
 displaying a function object palette screen in a function object palette screen
 region, wherein the function object palette screen includes a plurality of function
 objects; and

allowing a user to drag and drop a function object from the function object palette screen onto the mapping screen region using a user interface selection device.

⁷⁰69. The method of claim ⁶⁷66, further comprising:

selecting the function object; and

displaying a function object selection indicia adapted to indicate that the function object has been selected.

⁷¹70. The method of claim ⁷⁰69, further comprising:

displaying a function object properties page in a function object properties page screen region adapted to display a property associated with the selected function object; and

modifying the property.

⁷²71. The method of claim ⁷¹70, further comprising entering a constant value in the function object properties page.

⁷³72. The method of claim ⁷⁰69, further comprising selecting a plurality of function objects, wherein the function object selection indicia is further adapted to indicate that the plurality of function objects have been selected.

⁷⁴73. The method of claim ⁷³72, further comprising selecting the plurality of function objects by creating a box around the plurality of function objects using a user interface selection device.

⁷⁵74. The method of claim ⁶⁷66, further comprising displaying a user function object adapted to associate the at least one target node with the at least one source node.

⁷⁶75. The method of claim ⁷⁵74, wherein the user function object is associated with user script used by a compiler to generate compiled mapping output code, further comprising:

displaying a function object creation interface in the mapping screen region;
 and
 allowing the user to create the user script and to associate the user script with the user function object.

77
 76. In a mapping tool graphical user interface, a method of creating a mapping, comprising:
 displaying a graphical representation of a source object in a source screen region;
 displaying a graphical representation of a target object in a target screen region;
 creating a mapping between the graphical representation of the source object and the graphical representation of the target object in a mapping screen region using graphical mapping indicia;
 displaying at least a portion of the mapping in the mapping screen region; and
 displaying a scrolling indicia in the mapping screen region adapted to allow the user to selectively display portions of the mapping in the mapping screen region.

78
 77. The method of claim 76, wherein the mapping screen region comprises an outer perimeter, further comprising:

selectively displaying the scrolling indicia in the mapping screen region when the user moves a user interface selection device near the outer perimeter, wherein the scrolling indicia is further adapted to indicate a direction in which scrolling is possible;

selecting the scrolling indicia using the user interface selection device; and
 scrolling the mapping display in the direction indicated by the scrolling indicia when the user selects the scrolling indicia using the user interface selection device.

⁷⁸
78. The method of claim ⁷⁷76, further comprising displaying a mapping preview page in a mapping preview page region adapted to display the entire mapping.

⁷⁹
79. The method of claim ⁷⁹78, further comprising displaying a current region indicia in the mapping preview page adapted to indicate the portion of the mapping currently displayed in the mapping screen region.

⁸⁰
80. The method of claim ⁸⁰79, further comprising:
moving the current region indicia within the mapping preview page region;
and
changing the portion of the mapping currently displayed in the mapping screen region according to the movement of the current region indicia.

⁸¹
81. In a mapping tool graphical user interface, a method of creating a mapping, comprising:
displaying a graphical representation of a source object in a source screen region;
displaying a graphical representation of a target object in a target screen region;
creating a mapping between the graphical representation of the source object and the graphical representation of the target object in a mapping screen region using graphical mapping indicia;
displaying the mapping in the mapping screen region; and
displaying a test target object instance according to the mapping in a test screen region.

⁸²
82. The method of claim ⁸²81, further comprising:
displaying a test value page in the test screen region; and
associating a constant value with a node in one of the source object and the target object.

~~83.~~ ⁸⁴ The method of claim ~~81~~ ⁸², further comprising displaying a test output page in the test screen region adapted to display the test target object instance.

~~84.~~ ⁸⁵ In a mapping tool graphical user interface, a method of creating a mapping, comprising:

- displaying a graphical representation of a source object in a source screen region;
- displaying a graphical representation of a target object in a target screen region;
- creating a mapping between the graphical representation of the source object and the graphical representation of the target object in a mapping screen region using graphical mapping indicia;
- displaying the mapping in the mapping screen region;
- replacing one of the source and target objects; and
- preserving at least a portion of the mapping.

~~85.~~ ⁸⁶ A mapping tool graphical user interface, comprising

- means for displaying a graphical representation of a source object in a source screen region;
- means for displaying a graphical representation of a target object in a target screen region;
- means for creating a mapping between the graphical representation of the source object and the graphical representation of the target object in a mapping screen region using graphical mapping indicia; and
- means for displaying the mapping in the mapping screen region.

~~86.~~ ⁸⁷ The mapping tool graphical user interface of claim ~~85~~ ⁸⁶, wherein the source object further includes a source tree structure having a source root node, a source record node, and a source field node in a source screen region, and wherein the

target object further includes a target tree structure having a target root node, a target record node, and a target field node in a target screen region, further comprising

means for indenting the field nodes toward the mapping screen region in hierarchical fashion from the record nodes; and

means for indenting the record nodes toward the mapping screen region in hierarchical fashion from the root nodes.

⁸⁸
~~87.~~ The mapping tool graphical user interface of claim ⁸⁶~~85~~, further comprising means for displaying a graphical compiler object adapted to allow the user to generate compiled mapping output code using a compiler.

⁸⁹
~~88.~~ The mapping tool graphical user interface of claim ⁸⁶~~85~~, further comprising:

means for displaying at least a portion of the mapping in the mapping screen region; and

means for displaying a scrolling indicia in the mapping screen region adapted to allow the user to selectively display portions of the mapping in the mapping screen region.

⁹⁰
~~89.~~ The mapping tool graphical user interface of claim ⁸⁶~~85~~, further comprising means for displaying a test target object instance according to the mapping in a test screen region.

⁹¹
~~90.~~ The mapping tool graphical user interface of claim ⁸⁶~~85~~, further comprising:

means for replacing one of the source and target objects; and

means for preserving at least a portion of the mapping.